

## Title (en)

A selective extraction of uranium and Protactinium from material containing thorium

## Title (de)

Eine selektive Extraktion von Uran und Protactinium aus Thoriumhaltigen Material

## Title (fr)

Une extraction sélective de l'uranium et du Protactinium d'une matière contenant du thorium

## Publication

**EP 2578538 A1 20130410 (EN)**

## Application

**EP 12152025 A 20120122**

## Priority

PL 39656411 A 20111006

## Abstract (en)

The subject of the invention is the way of selective separation of uranium and protactinium from irradiated in a nuclear reactor materials containing thorium. The method of selective extraction of uranium and protactinium from materials containing thorium, especially separating micro-amounts of uranium and protactinium from macro-amounts of other components containing thorium, especially ThO<sub>2</sub>, consists in dissolving a sample containing U, Th and Pa using a mixture of nitric acid, hydrofluoric acid and Al(NO<sub>3</sub>)<sub>3</sub> in a hermetically closed vessel, made of polytetrafluoroethylene or derivatives of Teflon (PTFE, PFA). Next, the vessel is closed and heated in the temperature of 40-120°C for minimum 1 hour, after which the obtained clear solution is put onto a chromatographic column, filled with trioctylphosphine oxide (TOPO) adsorbed on a hydrophobic sorbent, favourably polystyrene-divinylbenzene, and elution is conducted, favourably of 50 ml solution which is a mixture of nitric and hydrofluoric acids with an addition of aluminium nitrate (favourably THOREX) at the pace of 0.2-10 mL/300 s, while at the column, 233 Pa is quantitatively retained and the effluent from the column which contains Th and U is quantitatively moved to a vessel made of polytetrafluoroethylene or its analogues (PTFE or PFA) and evaporated to the volume of 0.5-5mL. Next, we add 0.5-5mL of H<sub>2</sub>O, and next, the obtained solution is put onto the column, filled with quaternary aliphatic amine and conduct an elution with a solution which is a mixture of nitric and hydrofluoric acids with an addition of aluminium nitrate with H<sub>2</sub>O, at the eluent flow rate of 0.2-10 mL/300 s, collecting fractions of volumes of 0.1-10mL, selectively separating U and Th. Uranium is eluted quantitatively in first five fractions, favourably four fractions (v=10 mL) and next, Thorium in fraction 7-25 (v=39 mL).

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## Citation (search report)

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